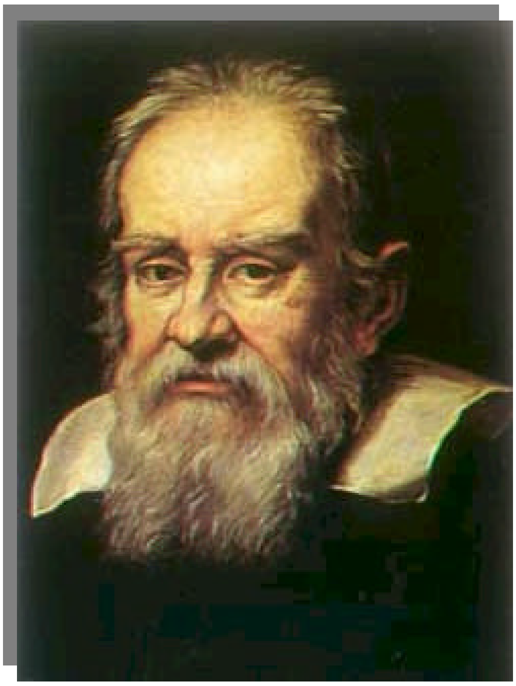
TRANSIT

The Newsletter of

Cleveland & Darlington Astronomical Society

05 September 2006



Galileo Galilei- 1564 to 1642

Editorial

Next meeting 8th September 2006 :

"Structure formation from the Big Bang to the Present"
by Professor Shaun Code of Durham University

Next meeting 13th October 2006

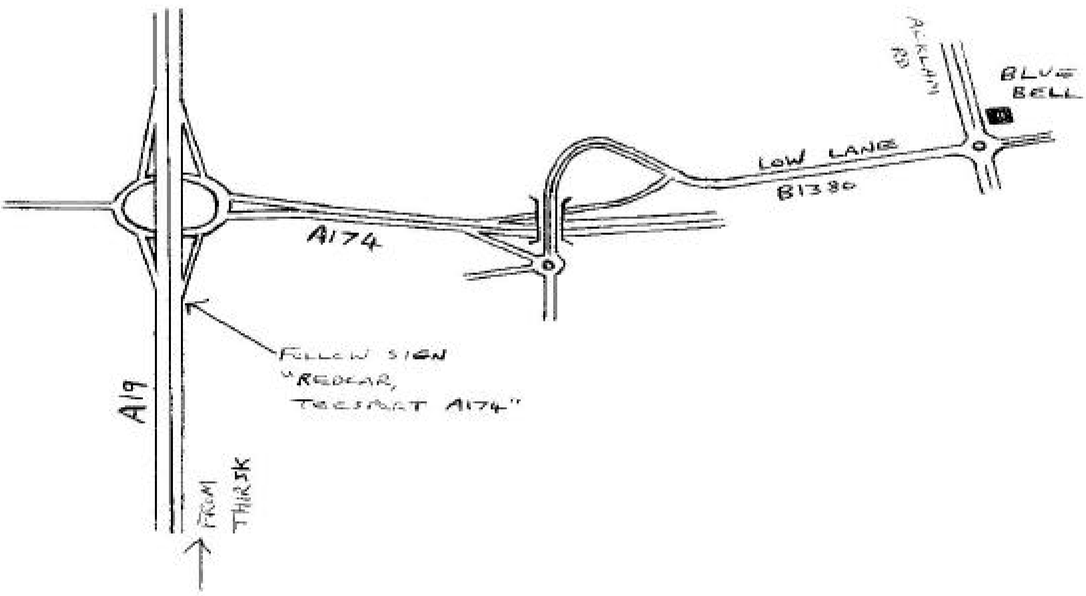
"The Scale of the Universe" by Paul Money FRAS FBIS

Yorkshire Astromind 2006 :

Date: Saturday 14 October 2006
Time: 1300 – 1700-ish
Venue: The Blue Bell Hotel, Acklam, Middlesbrough, Cleveland

<u>Directions:</u>

Approach Teesside on A19 from the south.
Leave A19 at exit marked "Redcar, Teesport A174." Follow A174 towards Redcar.
Leave A174 at first exit. Right at end of slip road, into Low Lane B1380.
At next roundabout, Blue Bell is ahead on left. Straight on at roundabout; car park is on left.
At Reception, ask to be directed to the Conference Room.



Letters to the Editor :

Any new observations, any comments on local or international astronomy, anything you want to share with your fellow members?

Dear Editor,

I hope that quote (one of the August Transit quotes attributed to Simon Singh) about Tycho being able to remove his nose was meant to be a joke - because it's complete rubbish!

Tycho most certainly did not have an "artificial nose", which could be removed. Saying that he "had his nose cut off" in a duel is as much an exaggeration as saying that Evander Holyfield "had his ear bitten off" by Mike Tyson!

What actually happened was that he had a piece cut out of the bridge of his nose, which he replaced with an artificial attachment.

In 1901, someone exhumed his skeleton, to verify the truth of the "false nose" story, and found that the above was the case, rather than the apocryphal "had his nose cut off" version. They also found that the false piece was made of a copper alloy, and not the gold of the popular myth.

Neil (Hon Sec)

Dear Editor,

There are many little things which I find annoying or irritating; here's a science-related one.

Why do people say "It's not rocket science!" as a sarcastic way of saying that something is simple? While this expression has become "part of the language" in recent years it's inappropriate and nonsensical. It infers, of course, that "rocket science" is something horrendously complex and difficult to understand - but it isn't!

Certainly, rocket *engineering* - making a rocket work safely and reliably, and making it controllable and steerable - is a very complex discipline. But rocket *science* - the actual physics behind the principle of the rocket - is remarkably simple; it's nothing more than Newton's Third Law! "For every action, there is an equal and opposite reaction" - that's all there is to it.

I guess "It's not rocket engineering" would be a bit too much of a mouthful. Perhaps we should say, "It's not nuclear physics", or "It's not quantum mechanics".

Neil (Hon Sec)

The pioneering physicist is best known for discovering radiation belts encircling Earth.

assigned reference number : UK1349126James Van Allen (1914–2006)
from Jeremy McGovern

August 10, 2006

James Van Allen died yesterday at age 91 in Iowa City, Iowa, from heart failure. He greatly contributed to the United States' space program during the early days of the Space Race and beyond.

"James Van Allen was one of the greatest and most accomplished American space scientists of our time, and few researchers had such wide range of expertise in so many scientific disciplines," says NASA Administrator Michael Griffin. "NASA's path of space exploration is far more advanced today because of Dr. Van Allen's groundbreaking work."

Born in Mt. Pleasant, Iowa, Van Allen graduated from Iowa Wesleyan College and the University of Iowa with a doctorate in nuclear physics in 1939 before joining the Department of Terrestrial Magnetism of the Carnegie Institution in Washington. He later moved to the Applied Physics Laboratory (APL) of Johns Hopkins University. In 1942, he enlisted in the U.S. Navy, serving in the Pacific Fleet during World War II. After being discharged, he returned to the APL to study German V-2 rockets from the war.

After a fellowship with Brookhaven National Laboratory, Van Allen became the head of the University of Iowa's physics department. There, he continued his experiments with rockets lifted by balloons prior to launch, taking instruments into the upper atmosphere. In 1958, a Geiger detector and a cosmic-ray experiment designed by Van Allen orbited Earth aboard Explorer I, the first American satellite. The subsequent data returned from this and future satellites revealed Earth is surrounded by a radiation belt, now known as Van Allen Belt. This discovery initiated magnetospheric physics research. Thanks to his work, Van Allen became a national icon, appearing on the cover of *Time Magazine* in May 1959.

"Great discoveries are the hallmarks of exploration," says Lou Friedman, founder and executive director of The Planetary Society. "Van Allen provided many such hallmarks, including the one that will forever bear his name around our planet. He was a great scientist, a great explorer and a great man."

During his career, Van Allen was the principal investigator for scientific investigations on 24 satellites and planetary missions, beginning with the first successful American satellite, Explorer I, and continuing with Pioneer 10 and Pioneer 11.

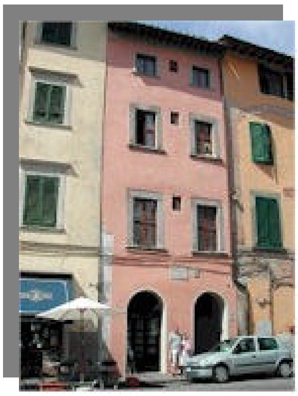
Although he retired from the University of Iowa in 1985, Van Allen continued to live in Iowa City and served as the Carver Professor of Physics, Emeritus

------------------------ooooooooooooooo-------------------------

A visit to Galileo Land

from Rob Peeling

What's holidaying in Tuscany got to do with astronomy? I only need to drop a single name - Galileo. Florence and Pisa are the key places associated with Galileo, both are in Tuscany and what's more it is very easy and cheap to travel between on the Italian railway. His birthplace in Pisa is well off the beaten track for tourist in Via Giusti close to the Chiesa di Sant'Andra. The lady in the tourist information bureau marked it out without hesitation on a street plan for us.



Today Galileo's birthplace is a pink-walled terraced house with an estate agents office on the ground floor. There is a engraved stone plaque to assure you that this is the right place and someone has put a somewhat cartoon-like picture of the great man in an upper floor window. Not much perhaps, but Galileo's house is at least occupied. Puccini's birthplace in Lucca was empty with restoration work in progress. A sign outside claimed it would be open in July 2006. Someone had crossed out 2006 and written 2010 instead. Much more on the tourist trail in Pisa is Galileo's house when he was at the University of Pisa which is on the Via Santa Maria. Again the lady in the tourist office marked it accurately on my map.

Horse drawn carriages of tourists come down the Via Santa Maria and the drivers point out the house. The tourist information lady said that there were some manuscripts to be seen in the morning but even just before midday the doors were thoroughly locked. This house is bright orange with carved wooden doors and a balcony, a far grander residence than Galileo's birthplace. Most of the buildings in the street, Galileo's house included are still part of the University of Pisa, belonging to various faculties.

In Florence, we went to the Museum of the History of Science which is on the bank of the river Arno backing onto the famous Uffizi gallery. This is where you can find Galileo's middle finger preserved as a relic. Revolting yet fascinating! I sneaked a photo before being charmingly but firmly told off. Visit the Medici family's mausoleum by S. Lorenzo's church and see all the bits and pieces of saints displayed there to try to understand why anyone would want to keep his finger. Clearly some of his friends thought Galileo would be forgiven by the church earlier than the 1980's and perhaps they even hoped he'd be canonized.

In the next room are the two remaining telescopes built by Galileo (not my photo - I'd been told off). The real surprise to me is that they were bigger than I expected from seeing them in books. They are around 4 feet long. The objective lens are tiny, not much over 3/4 inch. As it happens the glass case is placed so you can squat down and try to peer through. The circle of light in the eyepiece is miniscule. Galileo must have been a very patient man to achieve what he did with these instruments. The rest of the museum is an impressive collection of scientific instruments across the ages. Sadly they are just displayed.

A few hands-on working reproductions to explain exactly how they worked and some of the science would transform the museum from and interesting place to a wonderful place. This is where my Galileo trail ends but actually we missed out on one more site. The church of S. Croce in Florence is where Galileo's fine stone tomb is and there he lies minus finger but with his daughter (try Dava Sobel's book).

------------------------ooooooooooooooo------------------------

"My dear Kepler, what would you say of the learned here, who, replete with the pertinacity of the asp, have steadfastly refused to cast a glance through the telescope? What shall we make of this? Shall we laugh, or shall we cry?"

Letter from Galileo Galilei to Johannes Kepler

The following excellent articles are aimed at the youngster in your house or possibly an adult trainee astronomer. They have been copied into Transit *with permission of Steve Harris of the Newby Amateur Astronomical Society* (**www.naas**beginners**.freeuk.com/index.htm)**

TALKING ABOUT TELESCOPES

To most people the first question to ask about a telescope is "What magnification will it give?" but the important properties of an astronomical telescope are 'the light gathering potential' and 'the accuracy of the optics'. This means the bigger and more accurately configured the optics are, the more powerful the telescope.There are two basic forms of telescope, namely REFRACTOR or REFLECTOR.

The refractor uses a lens as its main optic to focus light into an image and a reflector uses a concaved mirror to focus the image. In both types the image may then be magnified and studied using an eyepiece rather like using a microscope.For any given size of primary optic, lens or mirror, the image is always the same size and cannot be changed without reconfiguring the main optic. The size of the image is however dictated by the focal length of the optics. (Focal length is the distance from the optic at which the image is formed.) The longer the focal length the larger the image formed.

The FOCAL RATIO is the relationship between the diameter of the main optic and its focal length. Focal lengths are usually identified as a *f*" number and is obtained from the formula :-

FOCAL RATIO (f number) = FOCAL LENGTH (divided by) APERTURE

So as an example take a lens or mirror of diameter 150mm and with a focal length of 900mm, this would have would have a focal ratio of :-

FOCAL RATIO = 900/150 = *f* 6

High focal ratio primary optics are selected where the need is for high magnification and low focal ratios used where a wider field of view at a lower magnification is desired. Of course an instrument with a long focal length requires a long mounting tube and would be very cumbersome and difficult to mount. A focal ratio of f6 is a good 'general purpose' instrument. Therefore careful consideration must be given when selection the focal length of a telescope which is to be bought or built.

So, what is a telescope ?. Of course everyone knows what a telescope is. We have all seen pictures of a sea captain looking through one and almost everybody has looked through a pair of binoculars, these are just two telescopes joined together. Patrick Moore often talks about his telescopes or about some of the big astronomical telescopes used by scientists all around the world but what is inside and how do they work, that is what we want to know here.All telescopes including binoculars and even radio telescopes such as the one a Jodrelll Bank consist of two vital main components. A primary focusing unit and a secondary magnifying unit (or amplifier in a radio telescope). All the other parts would be too many to list and discuss here in detail but are either used to support these two components or to improve or manipulate the images formed in the instrument.

THE PRIMARY OPTIC

This is the part of the telescope that gathers light and focuses it into an image inside the instrument. The human eye when exposed to complete darkness will open its pupil (the black part at the centre) to its maximum diameter to gather as much light as possible. The maximum diameter the pupil can open is about 8mm giving an area of 0.5 square centimetre. This is the maximum area through which your eye is able to capture light and convert it into a signal to the brain. The Primary Focusing Unit has the job of gathering a larger area of light and converging it into a smaller area where a picture is formed this is called the primary focus image which we shall call the 'image'. A primary focusing lens or mirror of 150mm (6") diameter will gather 182 square centimetres of light which can be seen is 364 times as much as the human eye. This means that whatever object or light source this primary focusing unit is pointed at will appear 364 times brighter than it would when viewed only with the naked human eye.

SECONDARY FOCUSING UNIT

The image can be seen if brought to focus on a piece of white card but cannot be viewed directly by the unaided eye. A special lens unit is used to view the image, this is known as the SECONDARY FOCUSING UNIT or 'Eyepiece'. The Eyepiece is, in effect, a microscope used to focus and magnify the image formed by the primary optic. The bigger and longer the telescope the bigger will be the image formed. By using different lenses in the eyepiece, all or part of the image can be magnified and examined. By using a large, shallow curved eyepiece lens, (long focus) a wide angle, low magnification view of all or most of the image can be seen. Using a small deep curved eyepiece lens, (short focus) a high magnification view of part of the image can be seen. This is a simplified explanation of the eyepiece, in fact almost all eyepieces have at least two lenses some have more to improve the quality of the viewed image.

REFRACTING TELESCOPES

All refracting telescopes use a glass lens as their primary focusing unit. This lens is normally made up from two or more lens components to produce a clearer image and reduce colour distortions caused in the refracting process as explained below. Lenses use the property called REFRACTION to change the direction of rays of light and direct them towards a desired position. Refraction occurs when light passes between two different transparent materials such as glass, air and water. This effect can be seen when we put the straight pole of a fishing net into the river, the pole seems to bend at the surface. When light passes, at an angle, through the surface of a block of glass the angle is changed. As the light re-emerges through the opposite side of this material its angle will be changed again back to its original angle. To utilise this phenomena lenses are produced with a curved surface so when parallel rays of light meet the surface it will present an angled surface to each ray. The paths of all the rays hitting the lens will be bent towards the centre line of the lens. As the light emerges from the back face of the lens it is again bent. If the back surface is convex the same as the front surface then the light will be bent even more towards the centre line of the lens.

Creating an image

The purpose of the main optical element of a telescope (primary mirror or lens) is to gather light from an object and concentrate the light into an image. This image is a fixed size but the size depends on the focal length of the optics, the longer the focal length the larger the image will be. The focal length is the distance from the mirror or lens to where the image is formed. A 150mm (6 inch) telescope with a focal length of 1000mm (39 inches) may create an image, of the full Moon, 10mm in diameter. A 150mm telescope with a 2000mm focal length may produce an image, of the full Moon, 15mm in diameter.

CALCULATING THE MAGNIFICATION

The magnification of a telescope is determined by the focal length of the eyepiece being used and takes into account the focal length of the main optics. The magnification is calculated by dividing the focal length of the main optics by the focal length of the eyepiece being used. For example a 25mm eyepiece used on a 1000mm focal length telescope will give a magnification of 1000 divided by 25 = 40. A 10mm eyepiece used on the same telescope will produce a magnification of 1000 divided by 10 = 100. The two eyepieces in the example above used on a 2000mm focal length telescope will give 2000 divided by 25 = 80 and 2000 divided by 10 = 200. A long focal length eyepiece will produce a low magnification but have a wide field of view whereas a short focus eyepiece will have a higher magnification and a narrower field of view.

THE BARLOW LENS

A special lens called a 'Barlow' can be inserted into the light path before the eyepiece to double or in some cases treble the magnification of the eyepiece being used. A 2x Barlow used with the 1000mm telescope and the 25mm and 10mm eyepieces will give additional magnification of 80x and 200x.

FOCUSING THE TELESCOPE

All people have differences in their eyesight and various makes of eyepieces have a difference in their focusing position. This means that the focusing of the eyepiece has to be adjustable to suit the person using the telescope and the eyepiece being used. Telescopes are therefore fitted with a Focuser to adjust the position of the eyepiece. The focuser usually has a knob which when turned moves a tube in or out of the focuser housing. The eyepiece is mounted into the tube and normally clamped using a thumbscrew. The Barlow Lens mentioned above is mounted in a housing which can be fitted into the focuser and an eyepiece then fitted into the Barlow mounting.

THE FINDER

Telescopes usually have a quite long focal length and therefore have a narrow field of view. That means they can only view a small area of sky even with a low power eyepiece fitted. With only a small area of sky visible through the telescope it can be very difficult to find and object to be observed. Most telescopes have a smaller low powered telescope called a Finder mounted on the tube to help find the object. A finder has a view similar to that seen through a pair of 10 x 50 binoculars. The finder is used to locate the object to be viewed and may have cross hairs to enable the object to be centralised in the finder. Once the object has been centralised in the finder it should be somewhere in view in the eyepiece of the main telescope. It will of course be necessary to align the two telescopes so they are looking in the same place. This can be done, by finding a bright object such as the Moon, a bright planet or star that will be quite easy to find in the main telescope, using a low power eyepiece. The finder is usually mounted in a housing, fitted with two sets of three adjusting screws. By adjusting the screws the finder can be aligned to the object located in the main telescope and then locked in position.

TELESCOPE MOUNTINGS

Telescopes are usually supported in one of two kinds of mounting, these are an Altazimuth or an Equatorial. An altazimuth is the type of mounting that a seaside telescope would be mounted on. It will usually have a fork mounting with a bearing on each side of the tube to allow the telescope to be aimed up and down rather like the trunnions on an old cannon. The fork mounting will in turn be supported on a turning bearing which will enable the telescope and fork mount to be swivelled to the left or right. The Dobsonian design is the most popular type of altazimuth mounting used on astronomical telescopes. This design is in the form of a wooden box section mounted in a turntable with trunnion bearings fitted to the top of the box section. This provides a simple, cheap but very stable mounting.

------------------------ooooooooooooooo-------------------------

OBSERVING THE MOON

For a beginner to astronomy, the Moon is an excellent place to start. It is large, bright, easy to find and covered in interesting things to see. It may still be necessary to locate the Moon as described above but a seasoned observer may be able to find it straight away without using the finder. The full Moon is most impressive to the naked eye but is probably least rewarding through a telescope. At full Moon the Sun is shining straight down on the surface and casts very little shadow. The best time to see specific features is as the terminator (the line between light and dark) passes over those features. The full Moon is also so bright that it may be uncomfortable to the eye. Filters can be bought to attach to the eyepiece to reduce the brilliance and improve contrast. A cheaper option is to make a cardboard mask to cover the end of the tube. Into this mask a hole of about 75mm can the cut to reduce the amount of light entering the telescope.

Depending on the conditions, high magnifications can be used. First centralise the object or region of the Moon to be observed using a low power eyepiece then carefully replace the eyepiece with a higher magnification (shorter focal length) eyepiece and refocus. The object will appear larger and more detail will be seen. Some things to look out for are obviously craters (more below), mountains, Maria (seas) valleys, rills and canyons. Craters come in many sizes, shapes and form and may even look completely different under differing lighting conditions. Large craters often have a central mountain or peak that may cast a shadow across the relatively smooth floor of the crater. Some of these larger craters may have terraced walls both inside and outside the main rim. There may even be smaller craters on the floor of the large crater or another crater may cut through the wall of a large crater. Some areas of the Moon are more cratered than others. There are large areas that have so many craters that there appear to be no smooth areas at all other areas have almost no craters.

STAR MAGNITUDES

When we look up into the night sky on a very clear night we can see up to about 5000 stars with the naked eye. There are of course many more stars up there but they are too faint to see. On the very clearest night at a very dark location away from any town lights a person with good eyesight can see stars as faint as the 6 th magnitude but what does this mean.

Astronomers measure stars in units called magnitudes but this is not a unit like a meter or a kilogram. Each magnitude is about 2½ times brighter than the previous magnitude that is in turn is 2½ times brighter than the previous magnitude. The larger the magnitude number the dimmer the star will appear. Very bright stars have negative (minus) numbers. There are two kinds of magnitude measurements used :-

APPARENT MAGNITUDE

This is how bright a star appears to be in our sky. Although this measurement tells us how bright each star appears it does not tell us how bright a star actually is. This is because all stars are at different distances from us. Those nearer appear brighter and those further away appear not so bright.

ABSOLUTE MAGNITUDE

This is how bright stars would appear if they were all the same distance away from us. Absolute magnitude is therefore a measure of the real brightness of a star. The standard distance for measuring absolute magnitude is 10 parsecs or 32.6 Light Years. Polaris the Pole Star has a magnitude of –5 absolute and is therefore 10,000 times brighter than our Sun would be at the same distance. The nearest star to our Sun is about 4 light years.

ABSOLUTE MAGNITUDES

-8 156250 x as bright as our Sun (7 Cass -8)

-7 62500 x as bright as our Sun (Rigel -7.1)

-6 25000 x as bright as our Sun (Betelgeuse -5.6)

-5 10000 x as bright as our Sun (Polaris -4.6)

-4 3800 x as bright as our Sun (Antares -4.4)

-3 1525 x as bright as our Sun (Spica -3.5)

-2 610 x as bright as our Sun (Alcyone -1.6)

-1 244 x as bright as our Sun (Regulus -0.6)

0 97 x as bright as our Sun (Arcturus -0.2)

1 39 x as bright as our Sun (Sirius 1.4)

2 15.6 x as bright as our Sun (Alcor 2.1)

3 6.25 x as bright as our Sun

4 2.5 x as bright as our Sun (Alpha Cent 4.4)

5 1 Our Sun has an Absolute magnitude of 4.8

6 2.5 x less bright than our Sun

7 6.25 x less bright than our Sun

8 15.6 x less bright than our Sun

It can be seen that a star, two magnitudes brighter than another star will be 2.5 x 2.5 = 6.25 times brighter. Three magnitudes will be 2.5 x 2.5 x 2.5 = 15.6 times brighter. So a star with a magnitude of 13 will be 156250 times fainter than a star of magnitude 0. Very bright stars have a magnitude less than 0 and therefore have negative magnitudes for example Sirius in Canis Major is the brightest star visible from Britain and has an apparent magnitude of –1.47. Venus has a maximum apparent magnitude of –4.5 and the Sun is -27.

stronomers studying variable stars, use stars of a known magnitude to estimate the changing brightness of the star they are studying. Experts in this field can judge the brightness of a variable star to less than a tenth of a magnitude.

STAR COLOURS

When we look up into the night sky the stars look much the same. Some stars appear brighter than other stars but they all bok white. If the stars are looked at through a pair of binoculars some appear to be different colours. Many stars look quite orange in colour and some have a blue / white tint. The colour of a star depends on its surface temperature and indirectly on their size.

Generally the more massive a star is, the hotter and more powerful it will be. This is not the same a physical diameter mass refers to the amount of material in a star rather than how large the star is. If we can tell what the colour of a star is we can estimate how hot it is and therefore how large that star is.

The energy and heat produced by a star is directly proportional to the mass of that star. However a graph plotting mass against energy produced does not produce a straight line. The energy output of a star sharply increases with increasing mass. This produces a graph with a sharply increasing slope as the mass increases. A star that is perhaps ten times the mass of another star may be a million times more powerful.

GREEN WHITE ....Type W & O ..36000+ o C ..... Giant very hot and active stars

BLUE ....Type B .... 28600+ o C ....Very hot Helium stars

WHITE ....Type A .... 10700+ o C .... Large hot stars

YELLOW WHITE ....Type F .... 7500+ o C ..... Stars larger and brighter than our Sun

YELLOW .... Type G .... 6000+ o C .... Like our Sun

ORANGE .... Type K .... 4800+ o C ....Cooler smaller stars

ORANGE RED ....Type M .... 3400+ o C ....Old dying stars

RED .... Type N & S . .2500+ o C ……...Cool Carbon stars

When medium sized stars like our Sun are very young they tend to be very active and hot. Giant stars burn their fuel very fast and are also very hot both these types of star will shine white or blue or sometimes even green. Old stars become bloated into giants so the heat they produce and spread over a large surface area so they appear cooler and shine with a red colour much like when an electric fire element is cooling down. Very small stars don't produce so much heat so they also appear red and cooler.

By knowing the colour of a star the mass can be calculated. Then the absolute magnitude can be calculated. If the Absolute Magnitude is then compared to the observed Apparent Magnitude the distance that the star is from the observed point Earth can be calculated. By carrying out a simple analysis of the colour and brightness of a star a lot can be learnt about it.
The Type letter referred to in the table above, comes from a system that categorised stars in a sequence denoted by letters in the alphabet. However as knowledge grew the sequence was shuffled to reflect the true nature of the stars. Astronomers had however become used to the labels so the letters are not now in order.

OBSERVING MESSIER OBJECTS

Messier objects are clusters of stars, galaxies or clouds of gas and dust known as nebulae. A catalogue compiled by a French astronomer named Charles Messier lists 110 of the brightest of these objects. Messier was a comet hunter in the 18th century who became very annoyed when he kept finding 'fuzzy' objects that looked like comets but were not. To avoid being caught out Messier compiled his catalogue of all these 'fuzzy' objects he did not want to see. These objects are now the objects that most new astronomers seek out after they have checked out the planets. The 110 objects in Messier's catalogue are identified by being prefixed by a capitol M for example M3, M51 and M106. Messier objects can be grouped into three main categories, these are Galaxies, Star Clusters and Nebulae.

Galaxies are huge clouds comprised of millions of stars. Our Sun is one star in our galaxy that we call The Milky Way. All galaxies are located at vast distances from us and are therefore generally quite faint. One exception is M31, known as the Great Spiral Galaxy in the constellation of Andromeda. M31 can be seen any small telescope or even a pair of binoculars. As with all galaxies M31 should be observed using a low power eyepiece because they are faint and defused objects.

Star clusters come in two main types, Open Clusters and Globular Clusters. Open clusters are groups comprised of from ten or so up to a thousand or more stars that have formed in the same area of space within our galaxy. They may be quite close together or more often widely spaced. Most are best seen in a low powered eyepiece but the more closely pack ones may tolerate a little more magnification. Globular Clusters typically host between 10,000 and a million stars in a tight ball. They are located above and below the main spiral form of our galaxy and are almost like mini galaxies themselves. Some like M13 in Hercules and M3 in Canes Venatici (see page 1) are bright enough to be seen in binoculars or even with the naked eye on a good clear night. Globular Clusters are best found using low power but a higher power may be used to resolve the individual stars in the brighter examples.

There are a number of different types of Nebulae some examples are clouds of gas and dust where stars are being formed. The newly forming stars illuminate the clouds and cause them to glow. M42 in Orion is the brightest example of this type. Others are the remnants of stars which have reached the end of their active life and have blown off their outer layers. These are known as Planetary Nebulae because they looked like planets to early astronomers. M57 The Ring Nebula in Lyra looks like a tiny smoke ring and is typical of this type. Others are the remains of stars that have exploded in what is known as a Supernova, M1 in Taurus is one example.

All nebulae with the exception of M42 are faint and need low power to locate. A low power eyepiece will effectively concentrate the light into a smaller area so it will appear brighter. Once the eye has become used to the shape and form of the nebula a higher power eyepiece may be used to bring out some of the finer detail. This is particularly so with the brighter Planetary Nebulae but too much magnification will spread the available light over too wide an area and it may become too faint too make out any more detail.

In summary do not be too quick to increase the magnification, allow your eye and brain to become familiar with the object in view. It may require up to ten minutes for your senses to work out all the detail in a particular view. It is surprising how much more detail is discernable after a few minutes of concentration. When it is felt that no more detail is coming to your notice then experiment with increasing magnification. If no more detail is visible don't be afraid to go back to a lower power eyepiece.

WHERE WE ARE

If you were to travel through the vast emptiness of the universe you may eventually come across a collection of galaxies called Galaxy Group C7. One of the members of C7 is a large spiral galaxy containing over 100,000 million stars.

Deep in the suburbs of this galaxy, about 30,000 light years from the centre lies a rather unspectacular yellow star. This is our sun.
The only reason the sun lights up our sky is because it is so much closer than any other stars. When our part of the planet is facing away from the sun then the night comes and the sky is filled with thousands of distant suns.

There is much to see in the night's sky. With the unaided eye, there are the constellations, shooting stars (or meteors), several of the planets (Mercury, Venus, Mars, Jupiter and Saturn are all visible to the unaided eye), and of course our moon.
Also visible are some of the man-made interlopers in the night sky. Communication and weather satellites can often be seen (especially in the Summer) and you might see the International Space Station.

Many people have access to a pair of binoculars, but never think to turn them on the night sky. A decent pair of binoculars is a great way of getting in to astronomy. Binoculars gather in more light than the human eye so not only do they bring things closer, you can actually see a lot of stars that are invisible to the unaided eye.
Take a trip along the milky way with binoculars and you will see just how many stars surround us. Turn the binoculars on the moon and you can see many craters jump into focus. In the winter you can see the Orion Nebula (a stellar nursery) and star clusters such as the Pleiades and the Beehive cluster.
In the summer months you can see the Great Cluster in Hercules. This is a tightly knit group of about one million stars that appear like a faint ball of light. Also visible with binoculars is the Great Galaxy in Andromeda. A huge galaxy about 2.5 million light years from earth.

------------------------oooooooooooooo-------------------------

Transit Tailpieces

Custom Telescopes UK.

Glen Oliver, a long-time member of the Society, can supply telescopes and accessories of all kinds. He operates from Hartlepool and has a website,
http://homepage.ntlworld.com/glen.oliver/custom.htm
e-mail glen.oliver@ntlworld.com.

Support local businessmen! Glen tells me that he now has an Astronomy and Space books page on his website

Transit Adverts If you wish to let members know what you want to sell or what you are looking for, please send an advert for the magazine.

CaDAS Website Don't forget to visit our very own website at www.**wynyard-planetarium**.net.

Articles Please send contributions for the newsletter to Bob Mullen, 18 Chandlers Ridge, Nunthorpe, Middlesbrough, TS7 0JL, 01642 324939 (b2mullen@hotmail.com) Copy deadline date is the 25th of each month.

What finer tailpiece than a comet?

– Linear 2002/A2 imaged from Chile